

(12) UK Patent Application (19) GB (11) 2 247 494 (13) A

(43) Date of A publication 04.03.1992

(21) Application No 9116368.3

(22) Date of filing 10.06.1991

(30) Priority data

(31) 02151964

(32) 11.06.1990

(33) JP

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(51) INT CL⁵

A45F 5/02, H04B 1/08

(52) UK CL (Edition K)

E2A AAN AGW A106 A110 A120 A122 A370

H4L LERX L30

U1S S2204 S2205

(56) Documents cited

GB 1578490 A WO 90/08431 A1

(58) Field of search

UK CL (Edition K) A4G, E2A AAG AAN ACAM

AGKD AGKF AGW, H3Q QACX

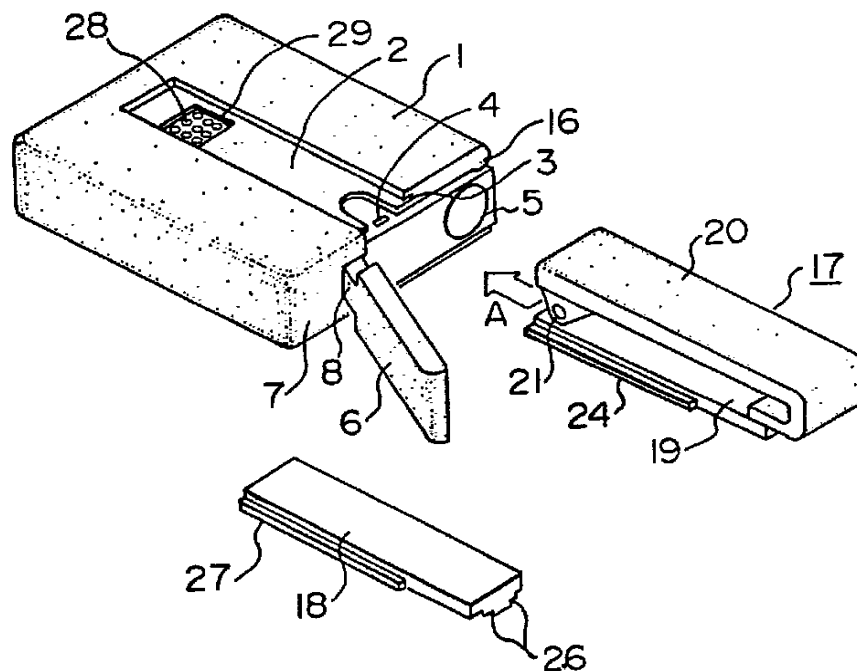
INT CL⁵ A45F 5/00 5/02, F16B

Online database:- WPI

(54) Belt clip for personal radio etc

(57) A portable radio equipment having a clip (17) and an exchange panel (18) which are adapted to be selectively fitted in a fitting groove (2) formed on the rear surface of a housing (1) incorporating a battery, a radio communication circuit, memory and the like, the clip (17) or the exchange panel (18) being releasably locked in the fitting groove (2), and having write-in terminals (28) connected to the memory and laid on the bottom part of the fitting groove (2), the write-in terminals (28) being shielded by the clip (17) or the exchange panel (18) fitted in the fitting groove (2).

FIG. 1



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FIG. 1

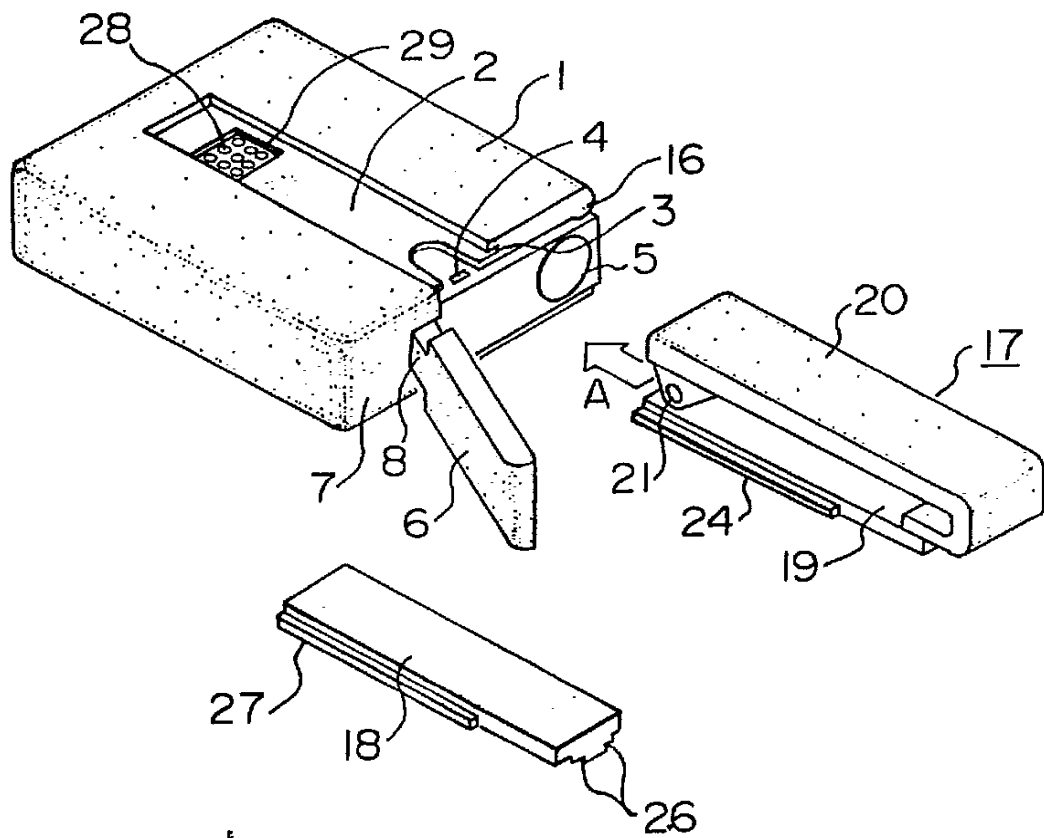


FIG. 2a

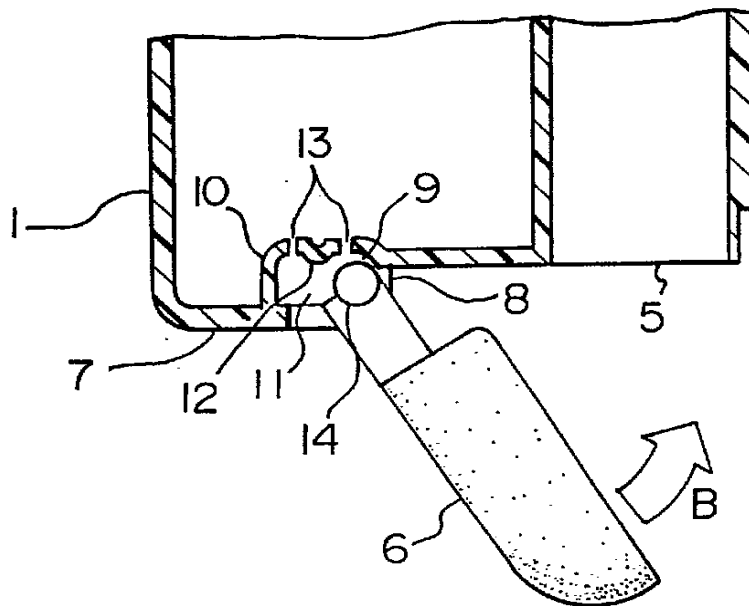


FIG. 2b

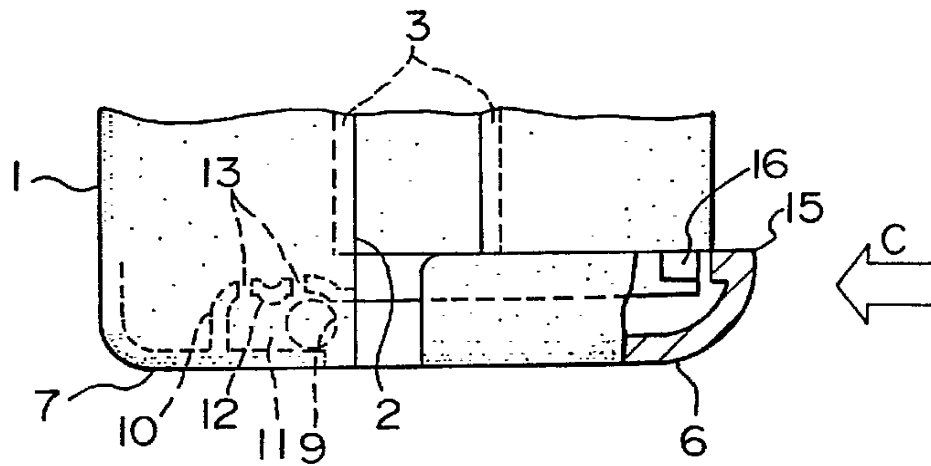


FIG. 3a

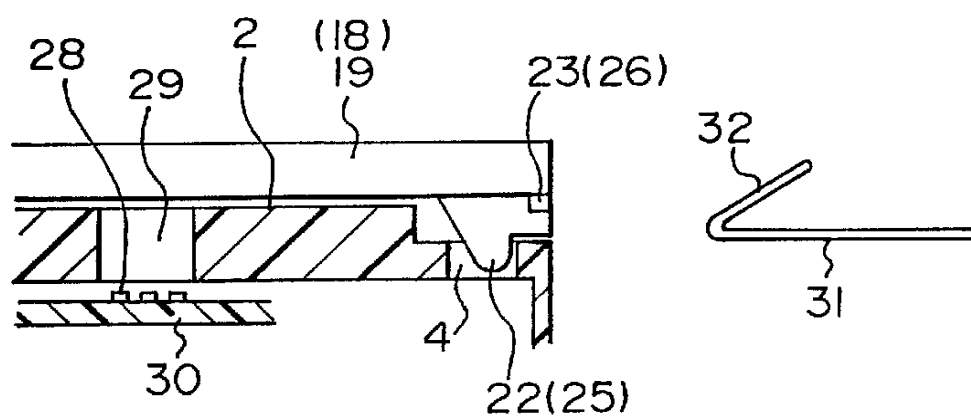


FIG. 3b

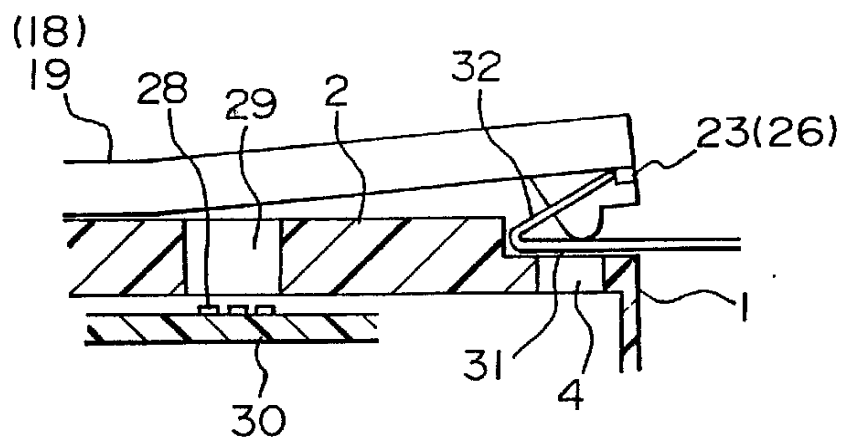


FIG. 4

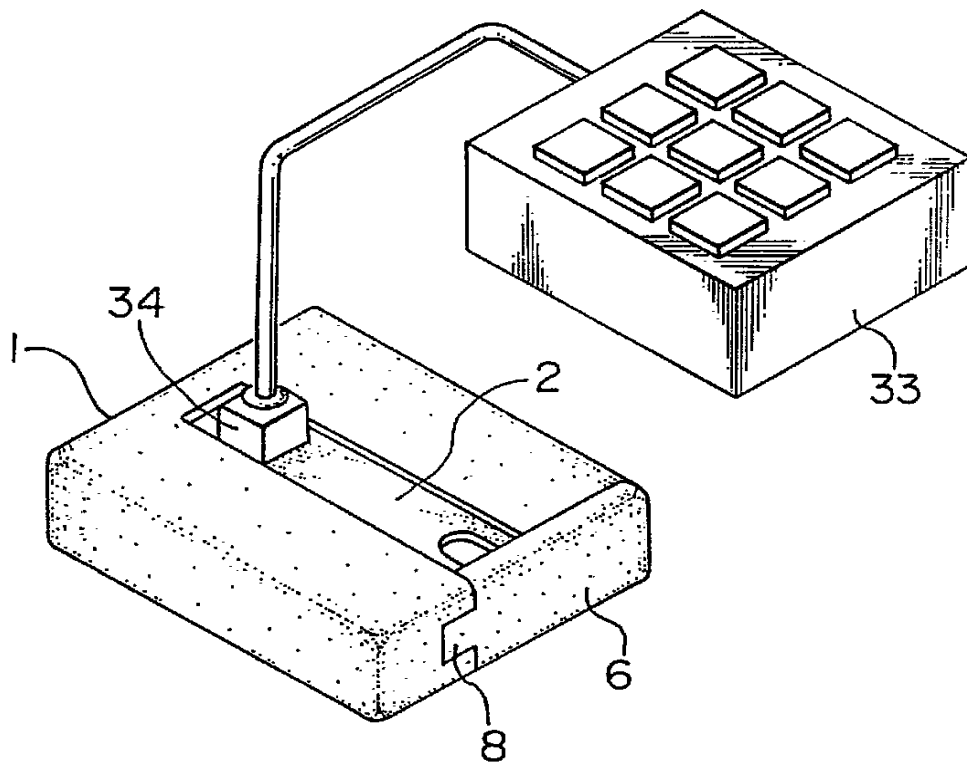


FIG. 5

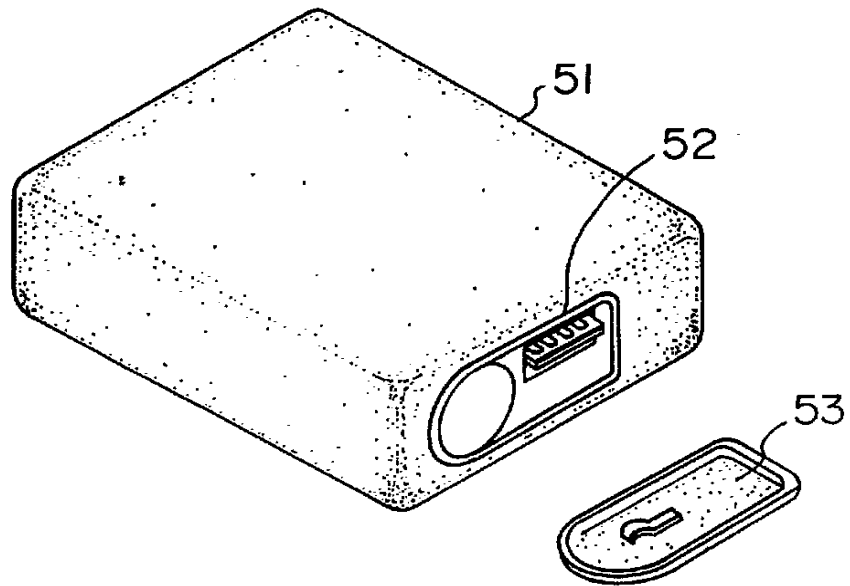


FIG. 6

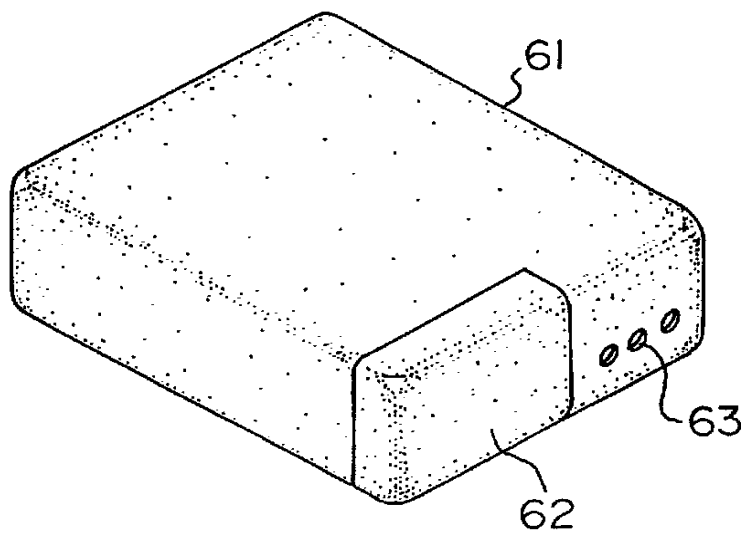


FIG. 7

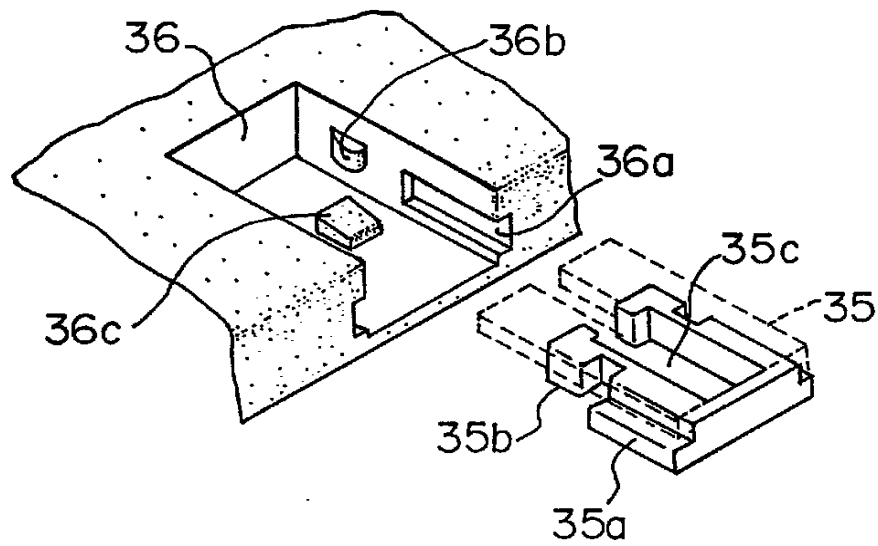


FIG. 8

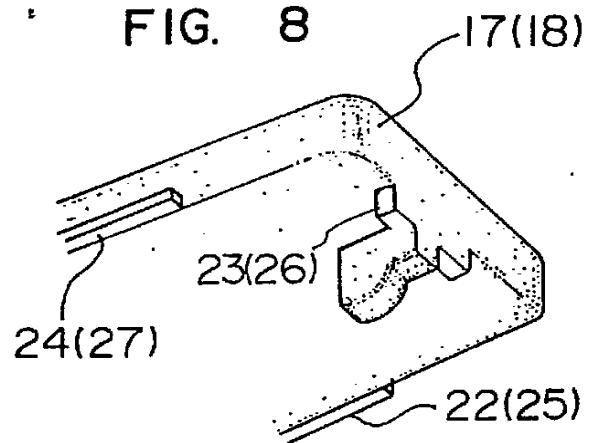


FIG. 9

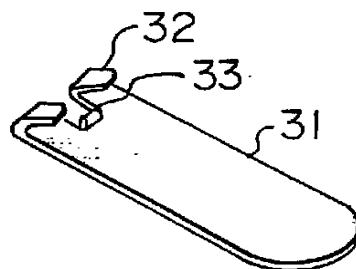


FIG. 10a

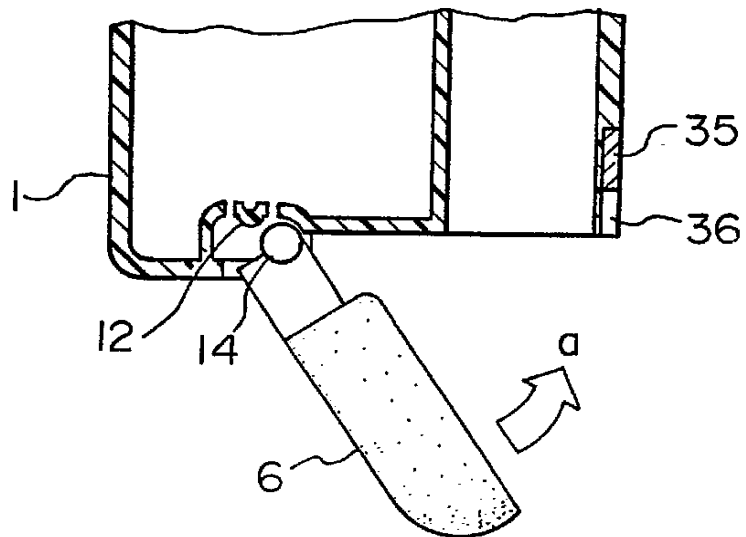


FIG. 10b

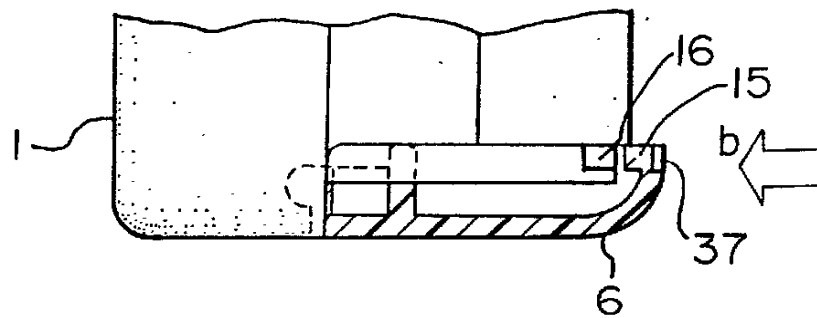
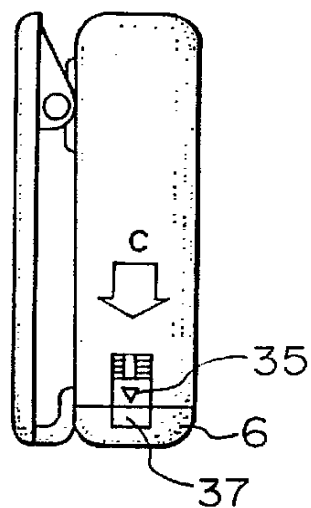


FIG. 10c



1 BACKGROUND OF THE INVENTION

The present invention relates to a miniature portable radio equipment.

DESCRIPTION OF RELATED ART

5 A miniature portable radio equipment of a certain kind incorporates therein ROM in which ID code is written upon delivery or use. Further, there have been known many kinds of arrangements, that is, in the device as shown in Fig. 5, write-in terminals laid on
10 the bottom part of a housing 51, are covered with a battery lid 53, and in an arrangement shown in Fig. 6, write-in terminals (which are not shown) are disposed inward of a hole 63 which is formed in the bottom part of a housing 61, adjacent to a battery lid 62. Further,
15 there has been known a portable radio equipment having a clip (which is not shown) which is attached to the rear surface of a housing and which is adapted to hook on a belt and a pocket of clothes worn by a person so as to prevent a portable radio equipment from loosening or
20 falling.

Such write-in terminals are important components of the radio equipment, and accordingly, has to be protected. However, in the above-mentioned conventional radio equipment, as shown in Fig. 5, the battery lid 53

1 is removed each time when a battery is replaced. Thus,
the write-in terminals 52 are exposed to the exterior
each time when the battery lid 53 is opened, and
accordingly, it can be easily touched by a human finger
5 or the like. Therefore, it is not preferable. Further,
with the conventional arrangement shown in Fig. 6,
since the write-in terminals are always exposed to the
inside of the hole 63, they are possibly affected by the
external circumstances, and therefore, it is unfavorable.
10 Meanwhile, in order to carry the portable radio equip-
ment, it is not only attached to a belt or a pocket of
clothes with the use of the clip, but it is held in a
handbag or a pocket without using the clip, particularly
in such a case that the portable radio equipment is
15 used by a woman. In the latter case, the clip is not
only necessary but becomes hampering. Further, in
order to enable the portable radio equipment to be used
in both ways, that is, with and without the clip, two
 housings with a clip and without a clip, should be
20 prepared, it cause the cost thereof to rise up.

BRIEF SUMMARY OF THE INVENTION

The present invention is devised in view of
the above-mentioned problem inherent to the conventional
portable radio equipment, and accordingly, one object
25 of the present invention is to provide a portable radio
equipment which can protect write-in terminals from
being touched by a human finger or against the external

1 environment, that is, it is possible to prevent useless
writing.

The other object of the present invention is
to provide a portable radio equipment which can be
5 hooked on a belt or a pocket of clothes worn by a person
with the use of a clip which can be removed when the
portable radio equipment is held in a handbag or a
pocket, thereby it is possible to aim at reducing the
cost thereof.

10 Further, the other object of the present inven-
tion is to provide a portable radio equipment which
prevents the clip from being unexpectedly removed, that
is, the clip can be surely locked onto the housing.

To the end, according to a first aspect of
15 the present invention, there is provided a portable
radio equipment comprising a housing in which an
electronic circuit and a battery are disposed, a fitting
groove formed in the housing; a clip and an exchange
panel which are selectively fitted in the fitting groove,
20 engaging means provided on both side edges of the clip
and the exchange panel, for slidably engaging the clip
and the exchange panel in the fitting groove; a locking
means adapted to releasably lock the clip and the exchange
panel in the fitting groove, and write-in terminals laid
25 on the bottom part of the fitting groove.

According to a second aspect of the present
invention, in addition to the first aspect of the present
invention, locking projections for releasing the locking

1 means are formed on the rear surface of each of the clip and the exchange panel.

According to a third aspect of the present invention, in addition to the first and second aspects
5 of the present invention, the clip and the exchange panel adapted to be selectively fitted in the fitting groove, are locked by a battery lid which is rotatably attached and releasably locked to the housing.

With this arrangement, according to the present
10 invention, since the clip is fitted in the fitting groove in the housing by the engaging means and is locked therein by the locking means, the portable radio equipment can be held being hooked on a belt or a pocket of clothes worn by a person. Meanwhile, since the exchange panel
15 can be fitted in the fitting groove, instead of the clip, and since it is locked in the fitting groove by the locking means, the portable radio equipment can be held in a handbag or a pocket without the clip which is hampering in this case. Further, since the write-in
20 terminals are laid in the bottom part of the fitting groove, and since the clip or the exchange panel is locked in the fitting groove, the write-in terminals can be surely shielded.

Further, the clip and the exchange panel can
25 be removed smoothly by use of a special unlocking tool which is inserted in a gap on the rear surface side of the clip or the exchange panel so as to release the locking means.

1 Further, since the clip or the exchange panel
is fitted and locked in the fitting groove in the
housing, and is further locked by the battery lid which
is also locked to the housing, the clip and the exchange
5 panel can be held in the housing with a high degree of
reliability.

These and other objects, and advantages as
well as features of the present invention will be more
apparent from the description of a preferred embodiment
10 which will be hereinbelow explained with reference to
the accompanying drawings, in which:

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view illustrating a
portable radio equipment in one embodiment form of the
15 present invention;

Fig. 2a and 2b are sectional views illustrating
a battery lid section of the equipment shown in Fig. 1,
among which Fig. 1a shows such a condition that the
battery lid is opened, and Fig. 2b shows such a condition
20 that the battery lid is closed.

Figs. 3a and 3b sectional views illustrating
a groove section shown in Fig. 1, among which Fig. 3a
shows such a condition that a clip or an exchange panel
is fitted in the groove while a releasing tool being
25 not inserted, and Fig. 3b shows that the clip or the
exchange panel is partly raised by the releasing tool
inserted;

1 Fig. 4 is a perspective view illustrating
the portable radio equipment in which the groove is
opened and a ROM writer is connected to write-in terminals
in the groove;

5 Fig. 5 is a perspective view illustrating a
conventional portable radio equipment;

Fig. 6 is a perspective view illustrating
another conventional radio equipment;

10 Fig. 7 is a perspective view illustrating a
lid locking groove formed in a housing shown in Fig. 1
and a latch plate whose main body or cover section is
shown by the chain line;

Fig. 8 is a perspective view illustrating
the essential part of the clip or the exchange panel;

15 Fig. 9 is a perspective view illustrating the
releasing tool shown in Fig. 3a or 3b;

Figs. 10a and 10b are sectional views illus-
trating the battery lid section of the housing, corre-
sponding to Figs. 2a and 2b;

20 Fig. 10c is a side view illustrating the
portable equipment with the clip being fitted thereon,
in which the battery latch plate is clearly seen.

DESCRIPTION OF THE PREFERRED EMBODIMENT

25 Referring to Figs. 1 to 3, a fitting groove 2
is formed in the center part of the rear surface of a
housing 1, and is formed on its both longitudinal side
walls with engaging grooves 3. The fitting groove 2 is

1 opened at one end part of the housing 1 so as to define
an opening through which a clip 17 or an exchange panel
18 which will be explained later can be introduced
into the fitting groove 2. The bottom part of the fitting
5 groove 2 is deeply cut so as to form a recess in the
vicinity of the opening of the groove 2, and a locking
hole 4 is formed on the bottom of the groove 2 within
the recess. A battery lid 6 which is adapted to open
and close a battery storage chamber 5 and the opening
10 of the fitting groove 2 is attached to the one end part
of the housing 1. More specifically, one side part of
the one end part of the housing 1 is formed therein with
a cutout 8 which defines therein a journal section having
first and second journal parts 9, 10 which are opposed
15 to each other through a space 11 within the journal
section. The space 11 is narrower than the journal
parts 11 since a partition projection wall 12 is
formed therein. This partition projection wall 12
is formed therein with slits 13 which give a resiliency
20 so that the partition projection wall 12 can be resili-
ently retracted. A shaft part 14 formed on the proximal
end part of the battery lid 6 is rotatably supported
by the first journal part 9 and can be displaced
between the first and second journal parts 9, 10 by
25 way of the space 11 while the partition projection
wall 12 being forced to be retracted. An engaging
protrusion 15 is formed at the inner side of the free
end part of the battery lid 6, and an engaging cutout

1 16 is formed in the one end part of the housing 1 on the
side remote from the cutout 8. Accordingly, when the
battery lid 6 is pushed after being closed so that the
shaft 4 is displaced from the journal part 9 to the
5 journal part 10, the engaging protrusion 15 is fitted
in the engaging cutout 16 so as to firmly lock the
battery lid 6.

A clip 17 and an exchange panel 18 can be
selectively fitted in the above-mentioned fitting groove
10 2. The clip 17 has a clip member 20 having a hook-like
part at its distal end and rotatably journalled at its
proximal end to one short side part of a base plate 19
by means of a shaft 21, and the distal end part of the
clip member 20 is urged against the base plate 19 by a
15 coil spring (which is not shown) and is therefore made
into close contact with the latter. Accordingly, the
clip member 20 can be rotated about the shaft 21, over-
coming the resilient force of the coil spring so as to
be displaced away from the base plate 19. A locking
20 projection 22 is formed integrally with the rear surface
of the base plate 19 at a position corresponding to that
of the locking hole 4, in the distal end part of the
clip member 20. Further, low height releasing protrusions
23 are formed integrally with the rear surface of the
25 base plate 19 on both sides of the locking projection
22. The base plate 19 has engaging ridges 24 adapted
to be engaged in the engaging grooves 3, and integrally
formed on both long side faces of the base plate 19.

1 These engaging ridges 24 are cut intermediately so that
they do not reach positions rear the locking projection
22. It is noted here that the dimensions of the ridges
and the grooves 3 are so selected that the locking
5 projection 22 side part of the base plate 19 can be
elastically deformed so as to be curved with the ridges
24 being engaged in the grooves 3 (Refer to Fig. 3b).
The exchange panel 18 is also adapted to be fitted in
the fitting groove 2, being flush substantially with the
10 rear surface of the base plate 19, and is integrally
formed thereon with a locking projection 25 and releas-
ing protrusions 26 similar respectively to the locking
projections 22 and the releasing protrusions 23, on one
short side part thereof. Further, engaging ridges 27
15 similar to the engaging ridges 24 of the clip 17 are
also formed integrally with the long side faces of the
exchange panel 18.

Further, write-in terminals 28 through which
ID codes are written in ROM is laid on the bottom part
20 of the fitting groove 2. That is, the write-in terminals
formed on a print circuit board 30 are disposed in a
hole 29 formed in the bottom part of the grove 2 so that
they are exposed to the outside through the hole 29.

The locking projection 22 or 25 of the clip
25 17 or the exchange panel 18 are released from the locking
hole 4 in the housing 1 by use of a releasing tool 31
which is clearly shown in Fig. 9, having engaging
protrusions 32 at its front end part, made of resilient

1 materials and bent in a V-like shape.

Referring to Figs. 3a and 3b together with Figs. 8 and 9, explanation will be made of the use mode of the portable radio equipment.

5 In the case of use of the portable radio equipment attached on a belt or a pocket of clothes worn by the user, after the battery lid 6 being opened, the engaging ridges 24 of the base plate 19 are fitted in the engaging grooves 3 through the opening of the fitting
10 groove 2, and is then slid along the grooves 3 in the direction of the arrow A until the clip 17 is fully fitted in the fitting groove 2. Since the ridges 24 are not completely extended to positions near to the locking projection 22, the locking projection 22 can
15 override the end part of the housing 1 due to an elastic deformation of the base plate 19 on the projection 22 side thereof. That is, as clearly shown in Fig. 3a, the projection 22 is adapted to be engaged into the locking hole 4. With this arrangement, the base plate
20 19 of the clip 17 fitted in the fitting groove 2 can be locked so that the write-in terminals can be covered or shielded. Thereafter, as shown in Fig. 2a, the battery lid 6 is turned in the direction of the arrow B about the shaft 14 supported on the first journal part
25 9, and is then pushed in the direction of the arrow C as shown in Fig. 2b. On the way of this placement through the space 11 from the first journal part 9 to the second journal part 10, a click feeling can be given

1 by the partition projection wall 12, and is then supported
by the second journal part 10. Meanwhile, the engaging
protrusion 15 is engaged and locked in the engaging
cutout 16. The locked battery lid 6 abuts against the
5 end face of the distal end part of the clip member 20
on the base plate 19 of the clip 17 so as to limit the
displacement of the clip 17, and accordingly, the clip
17 is surely locked. Accordingly, the portable radio
equipment can be attached to the belt or the pocket by
10 means of the clip member 20.

Meanwhile, in the case of the portable radio
equipment being held in a handbag, a pocket of clothes
or the like, at first the battery lid 6 is pulled in
the direction reverse to the direction of the arrow C,
15 and then the shaft 14 supported by the second journal
part 10 is shifted through the space 11 to the first
journal part 9 while deforming the partition projection
wall 12 and is then held thereby. Accordingly, the
engaging protrusion 15 is disengaged from the engaging
20 cutout 16 so that the battery lid 6 is released. Then,
the battery lid 6 is turned about the shaft 14 in the
direction reverse to the direction of the arrow B as
shown in Figs. 1 or Fig. 2a. Further, when the forward
end part of the releasing tool 31 is inserted between
25 the bottom part of the opening of the fitting groove 2
and the releasing protrusions 23 by use of a resilient
deformation of the engaging projection 23, the locking
protrusion 22 side of the base plate 19 of the clip 17

1 is elastically deformed and curved due to the repulsive
resiliency of the locking parts 32. Accordingly, the
locking projection 22 is disengaged from the locking
hole 4, that is, the clip 17 is released. In this
5 condition, since the front end parts of the locking parts
32 are engaged with the inside of the releasing protrusions 23, if the releasing tool 31 is pulled out, the
engaging ridges 24 of the clip 17 are slid along the
engaging grooves 3 in the housing 1, and accordingly,
10 the clip 17 is removed from the fitting groove 12.
Then, the exchange panel 18 is fitted in the fitting
groove 2, similar to the installation of the clip 7.
More specifically, the engaging ridges 27 of the exchange
panel 18 are inserted in the engaging grooves 3 in the
15 housing 1 through the opening of the fitting groove 12,
and then the engaging ridges are slid along the engaging
grooves 3 in the housing 1 until the exchange panel 18
is fully fitted in the fitting groove 12. Since the
engaging ridges do not reach positions near to the
20 locking protrusion 25, the locking protrusion 25 can
override the end part of the housing 1 and then engages
into the locking hole 4 as shown in Fig. 3a. Accordingly,
the exchange panel 8 can be fitted and locked in the
fitting groove 2, and further, the write-in terminals
25 can be shielded. Thereafter, the battery lid 6 is turned
in the direction of the arrow B as shown in Fig. 2a,
and is then shifted in the direction of the arrow C in
order to be locked. Thus, the exchange panel 8 can be

1 surely locked, as mentioned above. Accordingly, the clip 7 which becomes obstructive when the portable radio equipment is stored in a handbag or a pocket can be removed.

5 The removal of the exchange panel 18 from the housing 1 can be made, similar to that of the clip 17, and accordingly, the explanation thereof is omitted.

 Further, in order to write ID codes in the ROM, as shown in Fig. 4, the clip 17 or the exchange
10 panel 18 is removed from the fitting groove 2 in the housing 1 so as to expose the write-in terminals 28 to the outside through the hole 29, and the write-in terminals 28 are connected thereto with contact terminals 34 connected with a writing device 33 which is then manipu-
15 lated so as to write the ID codes into the ROM.

 Since the clip 7 or the exchange panel 18 can be held in the fitting groove 12 in the housing 1 under locking condition when the battery lid 6 is opened so as to replace batteries, there is no risk of missing
20 of the clip 7 or the exchange panel 18. Further, since the clip 7 or the exchange panel 18 can be removed only by use of the special releasing tool 31, it is difficult for third party to remove the clip 7 or the exchange panel 18.

25 Although the embodiment of the present invention has been detailed, the present invention should not be limited to this embodiment, but can be changed or modified therefrom within the spirit and the scope

1 of the invention which can be only limited by the
appended claims.

For example, the engaging grooves 3 can be
formed in the base plate 19 of the clip 17 or the exchange
5 panel 8 while the engaging ridges 24, 27 can be formed
on the side walls of the fitting groove 2 in the housing
1.

Further, in order to further ensure the locking
of the clip 17 or the exchange panel 18 in the fitting
10 groove 2 in the housing 1, it is preferable to use a
battery lid locking mechanism as shown in Figs. 10a to
10c. That is, a latch plate 35 is slidably fitted in
a shallow groove 36 formed in the side surface of the
housing 1 on the side where the distal end face of the
15 battery lid 6 is positioned when the latter is closed.
Further, the distal end face of the lid is formed
therein with a shallow groove 37 which is aligned with
the shallow groove 36 when the lid 6 is closed.

When the lid 6 is closed, the latch plate 35
20 is shifted toward the distal end part of the lid 6
so as to be extended between both grooves 36, 37, and
accordingly, the lid 6 is firmly locked. Accordingly,
this can, in turn, firmly lock the clip 17 or the
exchange panel 18 fitted in the fitting groove 12.

25 The latch plate 35 and the shallow groove 36
are clearly shown in Fig. 7. Engaging ridges 35a formed
on both side surfaces of the base of the latch plate 35
are engaged slidably in engaging grooves 36a formed in

1 the side walls of the shallow groove 36. When the
latch plate 35 is fitted in the shallow groove 36, a
cutout 35c formed in the base 35b of the latch plate 35
receives a raised part 36c formed on the bottom surface
5 of the shallow groove 36 while recessed parts formed
in both side surfaces of the base being fitted onto
protrusions 36b formed on the side walls of the shallow
groove 36. With this arrangement, the latch plate 35
can be prevented from coming off.

WHAT IS CLAIMED IS:

1. A portable radio equipment comprising:

a housing incorporating therein an radio communication circuit, memory, a battery and the like and having a rear surface, a front end face and a side face;

a fitting groove formed in said rear surface of said housing so as to be opened at the front surface of said housing and having side walls and a bottom part;

a battery lid rotatably mounted on the front end face of said housing, for closing an opening of a battery space in said housing;

a clip and an exchange panel which are adapted to be selectively fitted in said fitting groove, having both side faces;

engaging means formed on said both side faces of each of said clip and said exchange panel and on said side walls of said fitting groove, for slidably engaging said clip or said exchange panel in said fitting groove;

locking means provided on each of said clip and said locking plate and on said housing, for releasably locking said clip or said exchange panel in said fitting groove; and

write-in terminals connected said memory and laid in the bottom part of said fitting groove.

2. A portable radio equipment as set forth in claim 1, wherein at least one of releasing protrusions

for releasing said locking means is formed on each of said clip and said exchange panel.

3. A portable radio equipment as set forth in claim 1 wherein said clip or said exchange panel which is selectively fitted in said fitting groove is further locked by said battery lid when the latter is closed.